SECTION 089100

LOUVERS

PART 1 – GENERAL

101. SUMMARY

101.1 This Section covers the requirements for the design, manufacturing, furnishing, installing, inspection, and testing of louvers.

101.2 CONTRACTOR shall furnish and install louvers, bird screens, blank-off panels, structural supports and attachment brackets as shown on the drawings, as specified, and as needed for a complete and proper installation.

102. RELATED SECTIONS

102.1 Section 011900 Site Data

102.2 Section 230500 General Requirements for HVAC Systems

103. REFERENCES

103.1 Air Movement and Control Association International, Inc. (AMCA)

a. AMCA Standard 500-L Laboratory Methods of Testing Louvers for Rating

b. AMCA Publication 501 Application Manual for Louvers

103.2 American Society Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

a. ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality

b. ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings

103.3 The Aluminum Association Incorporated

a. Aluminum Standards and Data

b. Specifications and Guidelines for Aluminum Structures

103.4 American Society of Civil Engineers

a. ASCE 7-05, Minimum Design Loads for Buildings and Other Structures

103.5 American Society for Testing and Materials (ASTM)

a. ASMT B86, Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings

b. ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

c. ASTM B211, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire

d. ASTM B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

e. ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

103.6 Architectural Aluminum Manufacturers Association

a. AAMA 800 Voluntary Specifications and Test Methods for Sealants

b. AAMA 605.2 Voluntary Specification for High Performance Organic Coatings on Aluminum Extrusions and Panels.

c. AAMA TIR Metal Curtain Wall Fasteners

d. AAMA 2605-98 Superior Performing Organic Coatings on Aluminum Extrusions and Panels

103.7 Canadian Standards Association

a. CAN3-S157-M83 Strength Design in Aluminum

b. S136 94 Cold Formed Steel Structural Members

104. SUBMITTALS

104.1 The CONTRACTOR shall submit drawings and data in accordance with Section I – Contract Drawing and Data Requirements.

104.2 Product Data

a. Air flow and water entrainment performance test results.

b. Material types and thickness.

104.3 Shop Drawings

a. Include elevations, sections and specific details for each louver.

b. Show anchorage details and connections for all component parts.

104.4 Samples

a. Submit color chips for approval

105. QUALITY ASSURANCE

105.1 Single subcontract responsibility: Subcontract the work to a single firm that has had not less than six years experience in the design and manufacturing of work similar to that shown and required.

105.2 Provide AMCA and BSRIA test data as required to confirm that the louvers have the specified air and water performance characteristics.

105.3 Where applicable, submit test reports to confirm that the louvers meet the specified STC and Noise Reduction requirements.

105.4 Provide written warranty to the DISTRICT that all products will be free of defective materials or workmanship for a period of one year from date of installation.

106. DELIVERY, STORAGE AND HANDLING

106.1 At the time of delivery all materials shall be visually inspected for damage. Any damaged boxes, crates, louver sections, etc. shall be noted on the receiving ticket and immediately reported to the shipping company and the material manufacturer.

106.2 Storage:

a. Material may be stored flat, on end or on its side.

b. Material may be stored either indoors or outdoors.

c. If stored outdoors the material must be raised sufficiently off the ground to prevent it being flooded.

d. If stored out doors the material must be covered with a weather proof flame resistant sheeting or tarpaulin.

106.3 Handling:

a. Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking.

b. Louver sections may be hoisted by attaching straps to the jambs and lifting the section while it is in a vertical position.

c. Louver sections should only be lifted and carried by the jambs. Heads, sills and blades are not to be used for lifting or hoisting louver sections.

106.4 CONTRACTOR shall be fully responsible for the storage and protection of all louvers, louver operators and accessories in the manner recommended by the supplier and manufacturer.

106.5 After louvers and louver actuators are installed, CONTRACTOR shall be fully responsible for protecting these items from being damaged during the balance of the construction period, or until accepted by DISTRICT. This shall include CONTRACTOR's responsibility for preventing all trades, whether employed by CONTRACTOR or other contractors, from using louver blades, mullions, operators or louver screens, etc. as supports for scaffolding, ladders or other detrimental uses.

PART 2 – PRODUCTS

201. GENERAL

201.1 Louver frames and blades shall be extruded 6063-T5 aluminum alloy.

201.2 Screens:

a. Screen frames shall be 6063-T5 extruded aluminum with a minimum thickness of 0.081 inch and shall be rewirable.

b. The screens, mounted on the interior faces of louvers unless otherwise noted on drawings, shall be ¾ inch mesh.

c. Wire shall be aluminum with 0.092 inch diameter intercrimped at ¼ inch intervals.

201.3 Design and Details

a. Design loads including wind loads shall conform to ASCE 7-05, unless otherwise indicated.

b. Design all materials to withstand wind and snow loads as specified in Section 011900. Maximum allowable deflection for the louver structural members to be l/180 or 0.75 inch, whichever is less. Maximum allowable deflection for the louver blades to be l/120 or 0.50 inch across the weak axis, whichever is less.

c. Louvers shall be assembled by welding and mechanical fasteners.

d. Louvers shall have a downspout in both louver jambs, capable of draining rainwater from the drainable blades. The bottom blade of each louver shall be located with a slot between the sill and the blade to facilitate the run off of water from the downspouts. The interior of the louver between the sill and first blade shall be blanked off.

e. The fixed blades of operating dual combination louvers shall have drainable blades.

f. All louvers shall be furnished with screens as specified herein

g. Linkages shall be concealed within the jamb with the drive assembly extended to the inside face of the jamb or louver mullion.

h. Seals: Louvers shall have blade and jamb seals. All seals shall be easily replaceable.

i. Louver Mullions: Horizontal and vertical louver mullions shall be provided as required.

j. Mounting angles shall be continuous aluminum mounting angles provided with louvers. When using vinyl gaskets for sealing, the mounting angles shall be grooved for permanent insertion or seals.

201.4 FINISHES

a. Louver finish shall be a polyvinyl dent fluoride coating containing a minimum of 70 percent Kynar resin. The coating shall be oven baked in accordance with manufacturer's written procedures. Color shall be selected by the DISTRICT.

b. Louver mullions, exterior screens and the exterior of louver penthouse shall have the same finish and color as the louver (be of finish and color selected by DISTRICT). Screen assembly shall be painted prior to installation to louver frames.

c. Mounted angles, interior screens and aluminum linkages shall be mill finished.

d. Steel components in the linkages of the operating louvers shall be cadmium plated.

202. FIXED LOUVERS

202.1 The minimum thickness of louver components shall be:

a. Heads, sills, jambs and mullions: 0.081"

b. Fixed blades 0.081"

c. Blankoffs Closures 0.081"

202.2 Performance Requirements

AMCA Performance: A 4' x 4' unit shall conform to the following:

Free Area	45% minimum
Pressure drop at a velocity of 800 fpm through the free area	0.15 in. H2O max.
Water penetration at free area velocity of 800 fpm	< 0.2 oz/ft^2
Water penetration at free area velocity of 1000 fpm	< 0.8 oz/ft^2

203. DUAL COMBINATION OPERATING LOUVERS

203.1 The minimum thickness of louver components shall be:

a. Heads, sills, jambs and mullions: 0.081"

b. Fixed blades 0.081"

c. Operating Blades 0.125"

d. Blankoffs Closures 0.081"

203.2 Linkage and Shafts:

a. Linkage for the operating louvers shall be made of 5005 aluminum plate or plated steel.

b. Movable blade shafts shall be a minimum of 1/2 inch diameter aluminum or zinc-alloy AG40A, ASTM B86.

203.3 Bearings for the operating louvers shall be made of self-lubricating nylon, TFE (tetrafluoroethylene), or ball bearings. Ball bearings shall have stainless steel balls and cadmium plated races.

203.4 Blade and jamb seals shall be vinyl.

203.5 Fasteners used in the assembly of louvers shall be Type 304 stainless steel.

203.6 Actuators – General

a. The operating dual combination louvers shall be provided with actuators as specified or required.

b. Each louver shall have one actuator. Two or more actuators per louver are not permitted. Actuator torque or thrust shall not be less than 200 percent of the torque required to meet the specified air leakage as specified herein, or to operate the louver at any operating mode with a pressure difference of ± 6 in. wg.

c. All actuators shall be factory mounted to the drive assembly extending through the louver jamb from the concealed linkages.

203.7 Performance Requirements

AMCA Performance: A 4' x 4' unit shall conform to the following:

Free Area	45% minimum

Intake Pressure drop at 800 fpm free area velocity	0.15 in. H2O max.
Exhaust pressure drop at 800 fpm free area velocity	0.15 in. H2O max.
Water penetration at a free area velocity of 800 fpm	< 0.2 oz./ft^2
Water penetration at a free area velocity of 1000 fpm	< 0.8 oz./ft^2

204. OPERABLE BACKDRAFT EXHAUST LOUVERS

204.1 The minimum thickness of louver components shall be:

a. Heads, sills, jambs and mullions: 0.081”

b. Fixed blades 0.081”

c. Operating Blades 0.050”

d. Blankoffs Closures 0.081"

204.2 Linkage and Shafts:

a. Linkage for the operating louvers shall be made of 5005 aluminum plate or plated steel.

b. Movable blade shafts shall be a minimum of 1/2 inch diameter aluminum or zinc-alloy AG40A, ASTM B86.

204.3 Bearings for the operating louvers shall be made of self-lubricating nylon, TFE (tetrafluoroethylene), or ball bearings. Ball bearings shall have stainless steel balls and cadmium plated races.

204.4 Blade and jamb seals shall be vinyl.

204.5 Fasteners used in the assembly of louvers shall be Type 304 stainless steel.

204.6 PERFORMANCE REQUIREMENTS

AMCA Performance: A 4’ x 4’ unit shall conform to the following:

Free Area	45% minimum
Pressure drop at 50 fpm free area velocity	0.05 in. H2O max.
Pressure drop at 200 fpm free area velocity	0.12 in. H2O max.
Pressure drop at 500 fpm free area velocity	0.24 in. H2O max.
Pressure drop at 1000 fpm free area velocity	0.80 in. H2O max.

205. ACCEPTABLE MANUFACTURERS

205.1 Airolite Company, LLC

205.2 Arrow United Industries

205.3 Construction Specialties, Inc

205.4 Greenheck

205.5 Ruskin Company

PART 3 – EXECUTION

301. INSPECTION AND TESTING

301.1 After louvers are installed and are ready for operation, inspect and adjust louvers to minimize air leakage.

301.2 All testing shall be performed in an AMCA approved laboratory.

301.3 Manufacturer's previous tests meeting the requirements of this Standard are acceptable.

301.4 Pressure drop and water penetration tests shall be conducted on a 4 foot 0 inch x 4 foot 0 inch louver, in accordance with AMCA Standard 500-L.

301.5 All testing for air leakage through closed operating louvers shall be in accordance with AMCA Standard 500-L. The air leakage test shall be conducted on a 4 foot 0 inch wide by 8 foot 0 inch high louver.

301.6 Tests shall be conducted with calibrated weights in applying the closing torque. The force to develop the torque shall be applied at the same location where the force shall be applied by the operating devices.

301.7 The torque shall be applied with zero static pressure difference across the louver.

301.8 A minimum of two tests shall be conducted on each sample. Between tests, the calibrated weights shall be removed, and the louver opened to full open; and then the louver reclosed and the calibrated weights reattached.

301.9 Tests shall be conducted at temperatures between 65°F and 85°F.

301.10 Test reports shall be submitted to the DISTRICT. Calculations for free areas of louvers shall be included in these reports.

END OF SECTION 089100